EC-Earth3-ESM
Earth System Model

Global Climate Model

IFS (Atmospheric Model):
T255 (0.75º) ~80km
L91 (top 0.01hPa) ~mesosphere
IFS-HTESSEL (Land Model)

NEMO (Ocean Model):
Nominal 1° Resolution
L75 levels (thousands km deep)

LIM (Sea-ice Model):
Multiple (5) ice category

Global Carbon Cycle Model

PISCESv2 (Ocean Biogeochemical Model*):*
Lower trophic levels of marine ecosystems

LPJ-GUESS (Dyn. Glob. Vegetation Model):
Process-based, plant functional types

TM5-CO2 (Atm. Chem. Transport Model):
34 layers, single-tracer version (CO2)

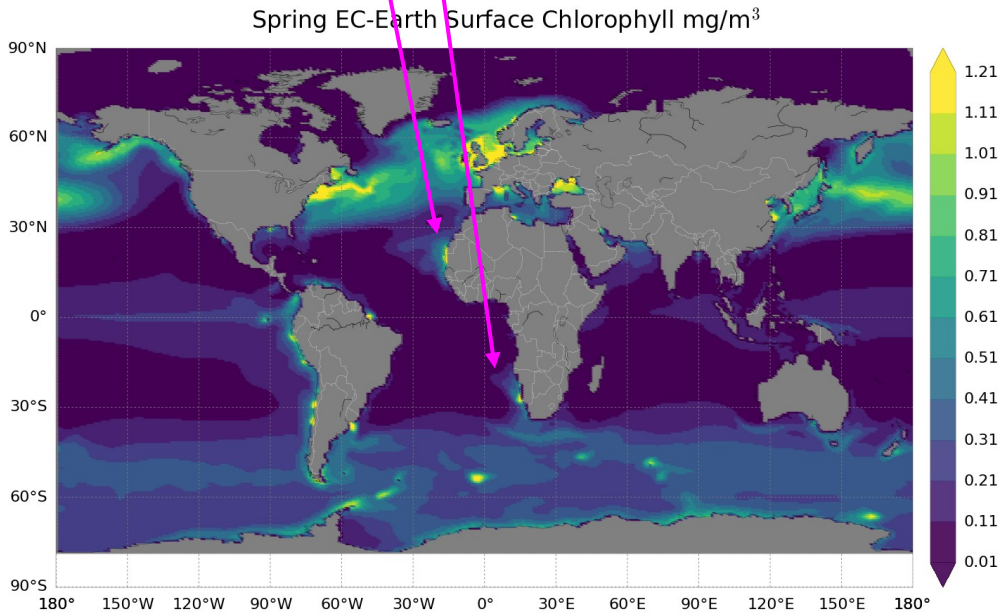
Model Components

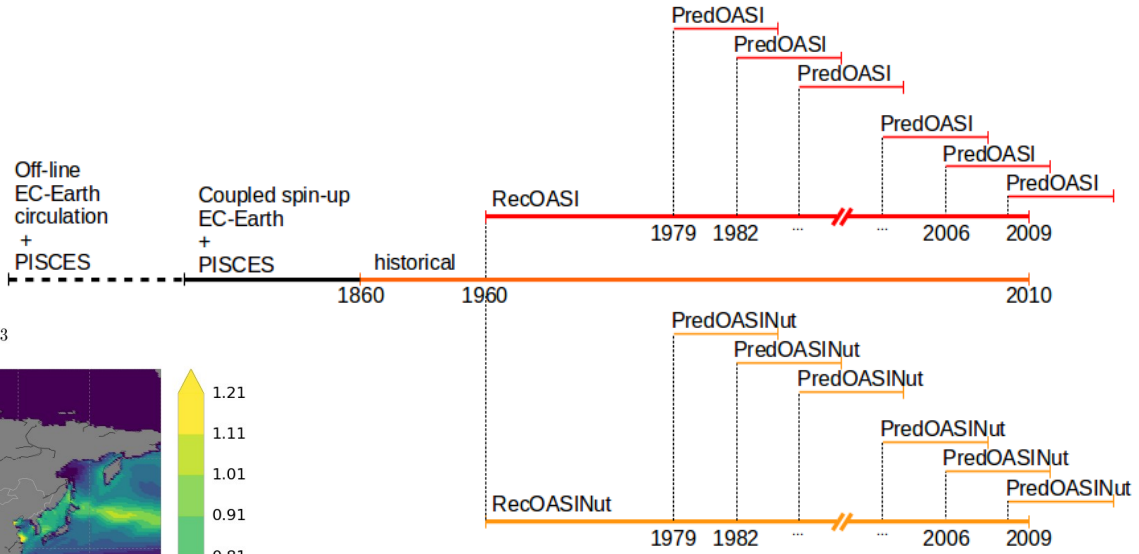
TRIATLAS

NeTNPPAO

Investigating mechanisms of predictability of ocean biogeochemical properties

Validation using satellite obs



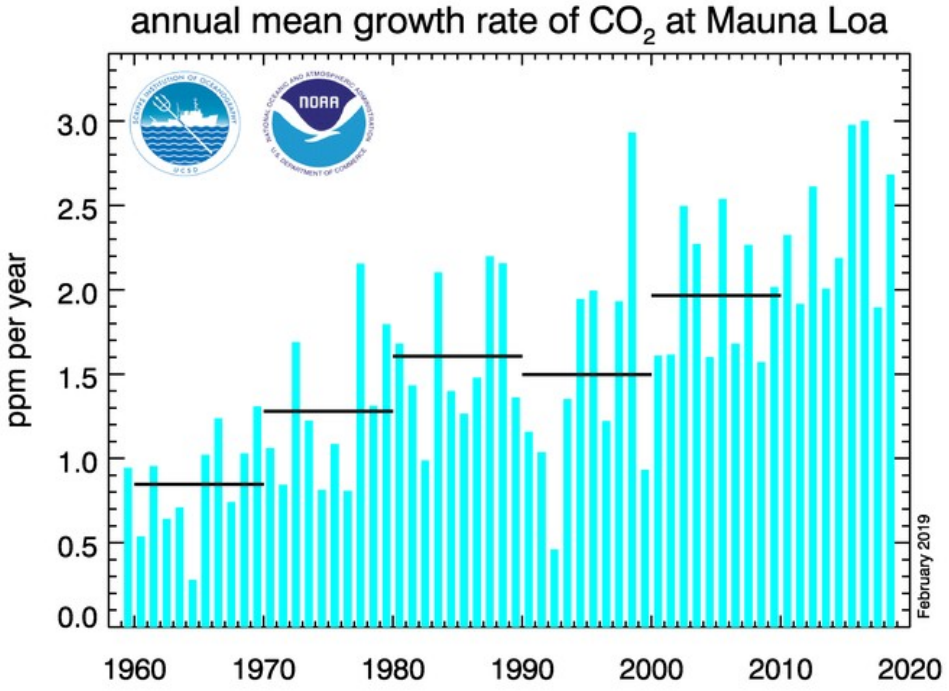


Retrospective decadal predictions using different initializations

CCiCC

Towards a near-term prediction of the climate and carbon cycle interactions in response to Paris Agreement emission trajectories

Variability in atm CO2 growth rate is mostly due to natural variability



Testing different ocean biogeochemical reconstructions as initial conditions

Retrospective decadal predictions of ocean and land carbon uptake

Idealized perfect-model experiments to investigate mechanisms of C uptake predictability in the ocean.

C4MIP requirements

DECK (CO2-concentration-driven)

-piControl (500 years)
-historical (165 years, 1850 - 2014)
-1pctCO2 (141 years)

EC-Earth + PISCES + LPJ-GUESS
non-interactive mode (no TM5)

947 years

DECK (CO2 emission-driven)

-esm-piControl (500 years)
-ems-hist (165 years, 1850-2014)

Tier 1

-1pctCO2-bgc (141 years)
-esm-ssp585 (86 years, 2015-2100)

EC-Earth-CC :
IFS+NEMO+PISCES+LPJ-GUESS+TM5

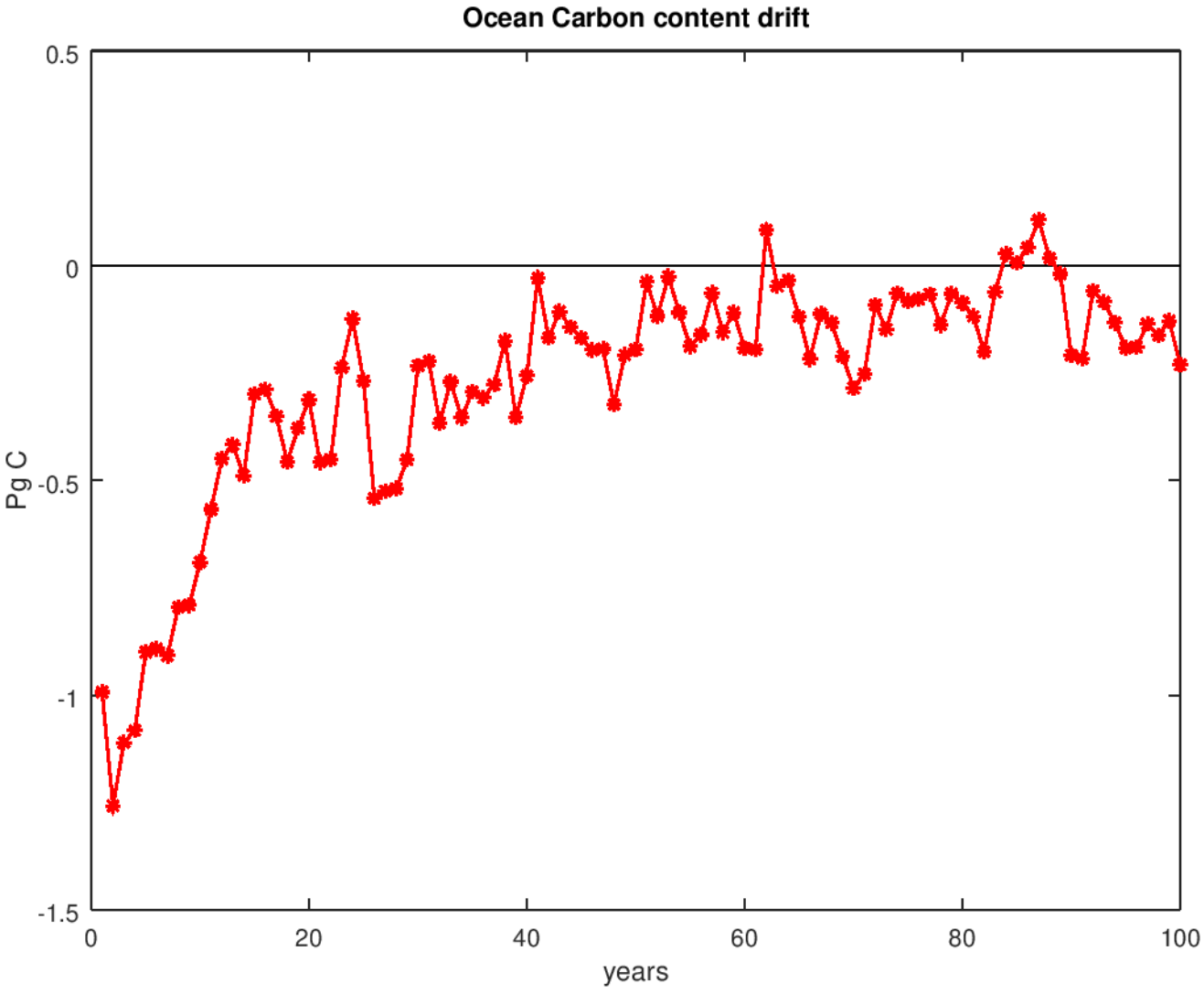
751 years

C4MIP status:

- spinup concentration-driven almost completed

- extension of spinup for emission-driven starting soon.

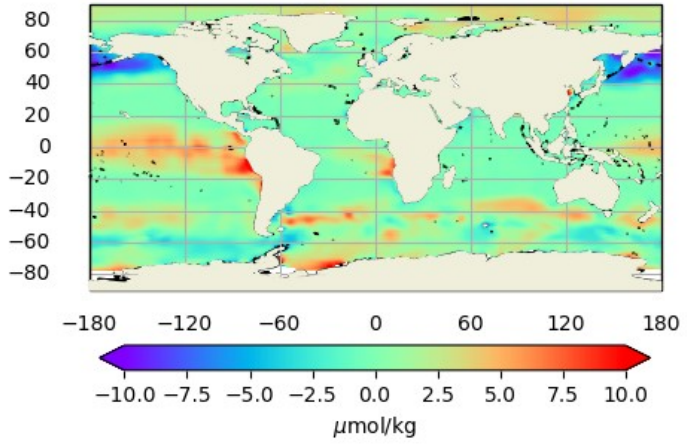
Actual C4MIP production to start in September with publication on ESGF early November



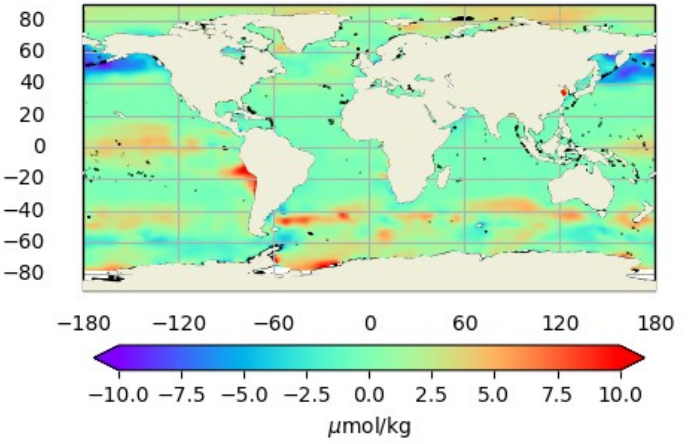
Ocean BGC reconstructions

Experiment	3D-nudging (T&S)	Surface restoring (SST&SSS)	no-nudging
a1yp	**Default:** τ (k= 2 ↔ z=1.5m) = 3 days τ (k=10 ↔ z=14m) = 3.1 days τ (k=20 ↔ z=61m = 3.2 days τ (k=30 ↔ z=180m = 3.8 days τ (k=40 ↔ z=500m) = 5.6 days τ (k=46 ↔ z=950m) = 9.2 days τ (k=50 ↔ z=1390m) = 15.4 days τ (k=60 ↔ z=3000 m) = 84 days τ (k=70 ↔ z=4900 m) = 329 days	**Default:** γ_T=-40W/m2/K γ_S=-150 mm/day	3°S - 3°N
a1z8	τ(M.L. < z < 800m) = 10 days τ(z> 800m) = 360 days	**Default**	15°S - 15°N
a1zs	**Default**	γT=-600W/m2/K γS=-2250 mm/day	3°S - 3°N
a20w	**Default**	**Default**	6.4°S – 6.4°N

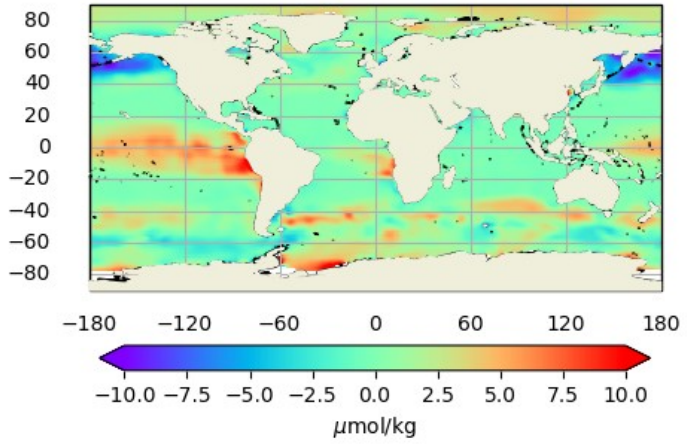
Mole Concentration NO3 (Exp. a1yp - Climatology WOA)



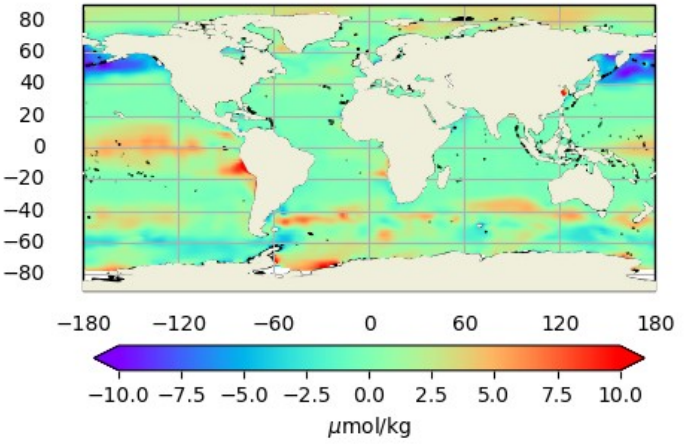
Mole Concentration NO3 (Exp. a1z8 - Climatology WOA)



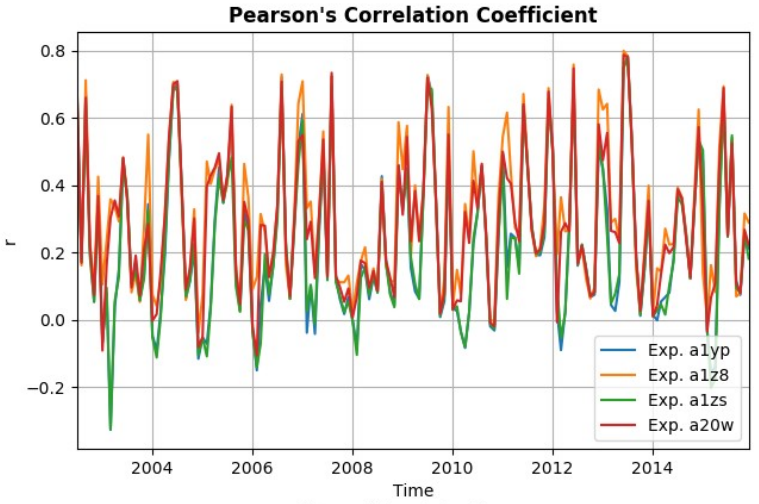
Mole Concentration NO3 (Exp. a1zs - Climatology WOA)

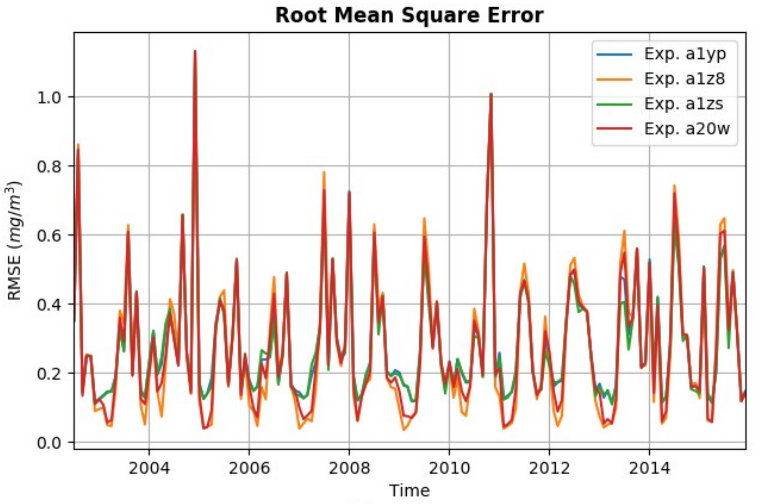


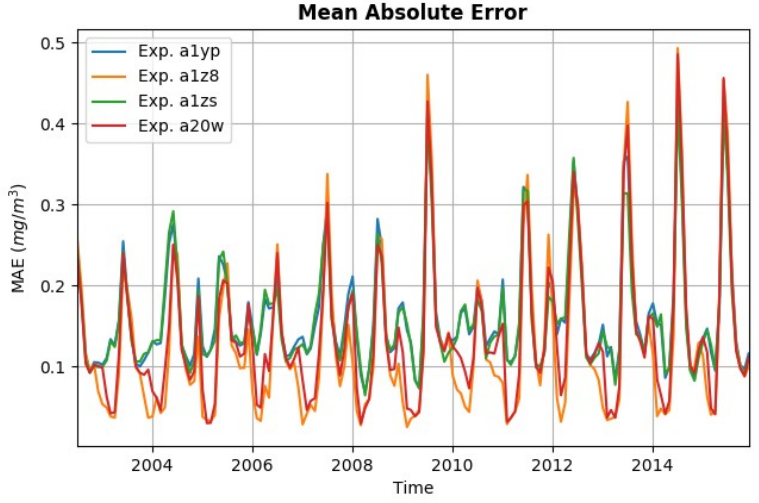
Mole Concentration NO3 (Exp. a20w - Climatology WOA)

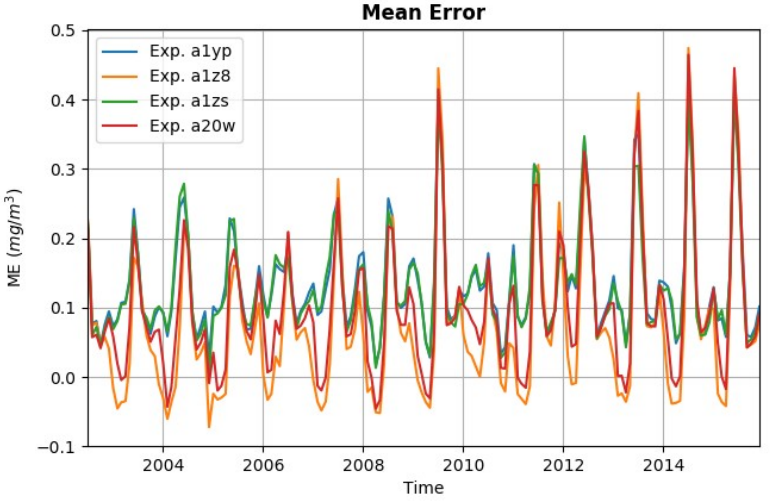


Equatorial Atlantic (-7 7N, -30 -10E) - time series metrics

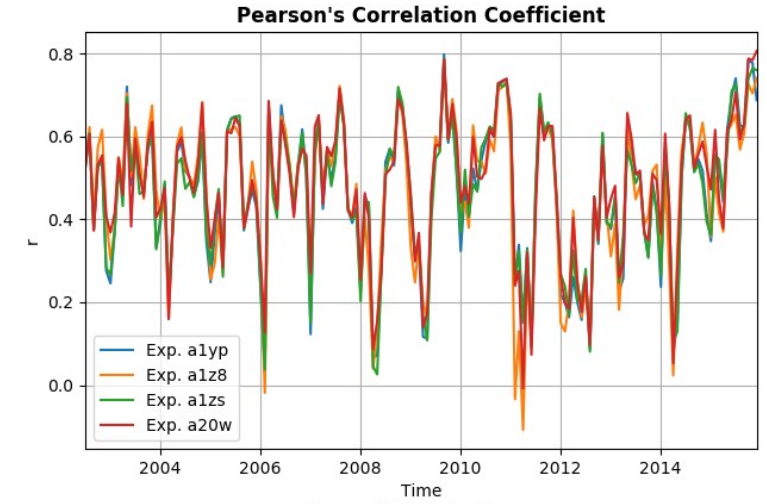


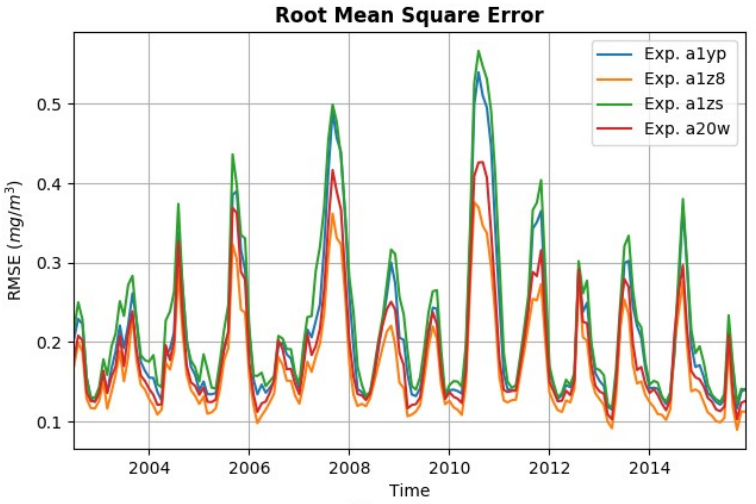


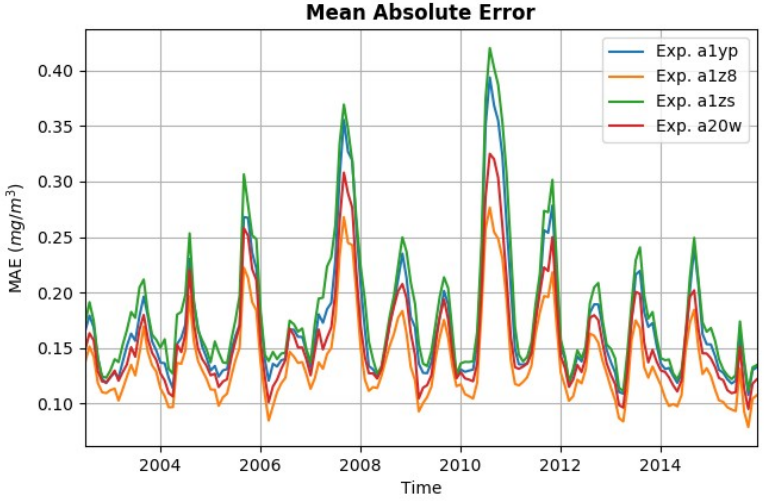


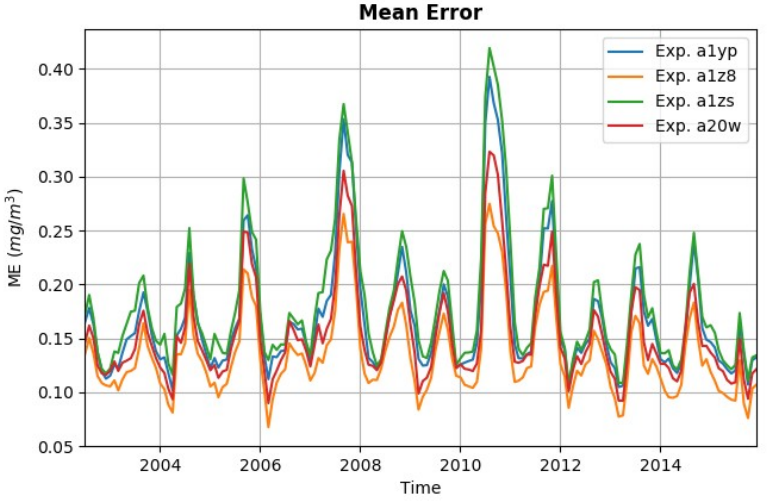


Equatorial Pacific (-10 10N, -135 -95E) - time series metrics









Namibian Region (-30 -10N, -40 20E) - time series metrics